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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

VALENTINE, DONALD R

ART UNIT

PAPER NUMBER

1742

DATE MAILED: 07/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/891,472

Applicant(s)

HONGO ET AL.

Examiner

Donald R. Valentine

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) 1-16 and 25-39 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 17-23 and 40-47 is/are rejected.
- 7) ☒ Claim(s) 24 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 13-23 and 40-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emesh et al in view of Gross et al.

Emesh et al shows apparatus with a transport route for transporting a substrate. (Col. 4, lines 37-42); a copper plating “section”, which are stations, (col. 7, lines 47-50); an electrolytic polishing or chemical polishing section (“station”), (col. 4, lines 12-22). The reference does not recite a specific annealing section “station”. What is shown is that annealing may be incorporated under certain conditions (col. 6, lines 25-27). A load and unload section is shown.

As for claims 14 and 40-44, a cleaning section is provided (see col. 4, lines 1-4). As for subsequent claims 15-22, the reference does not recite a specific first and second stage polishing but does suggest plural polishing stations (col. 4, lines 12-22); a specific “housing” is not recited; but the reference does disclose a cover, which is removable and overlies the polishing apparatus (col. 5, lines 7-1). Such a configuration appears to provide a “housing” in the sense that when the substrate is being moved from one station to another the movement would appear to occur within the confines of the cover. Figure 4, appears to show a substrate held in a surface down configuration. Figure 6, shows grooves and platen 700, (col. 11, lines 20-135) is considered to be a “cathode plate” and has channels through which electrolyte is supplied. A rotating substrate

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movement is shown; see col. 5, lines 40-50. A vacuum is applied to a wafer substrate; see col. 5, lines 56-65. A drying section is shown; see col. 5, lines 1-5.

Gross et al provide the process of copper plating, chemical polishing and annealing as it applies to formation of interconnects. This reference discusses the effect of annealing versus non-annealed copper as it pertains to grain size. Emesh et al discuss optional choice for controlling grain size as it pertains to annealing. (See col. 6, lines 24-27). Gross et al does not provide any showing of appropriate apparatus for the operation of the process described therein.

It would be considered within the skill of the art to practice the process of the secondary reference in the apparatus of Emesh et al because both processes are taught as it applies to the combination of process steps of plating copper on substrates, the primary reference describes optional conditions for utilization of annealing procedures, and Gross et al support the concept of the usefulness of annealing copper when grain size is of importance. Both references discuss the effect of additives on grain size of copper.

Allowable Subject Matter

3. Claim 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. The following is a statement of reasons for the indication of allowable subject matter: The references of record do not show or suggest apparatus with a housing, a transport route provide in the housing, a copper plating section, an electrolytic or chemical polishing section and an annealing section disposed along the transport route and wherein there is a cap-plating

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treatment section including a Pd-attaching treatment section and an electroless CoWP-plating section.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Pilling shows annealing prior to coating. Wada et al show annealing, and electrolytic or chemical polishing. Ritzdorf et al show annealing.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donald R. Valentine whose telephone number is 703-308-3327. The examiner can normally be reached on Monday-Friday 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 703-308-1146. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



Donald R. Valentine
Primary Examiner
Art Unit 1742

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July 15, 2003